

# **Service Acceptance Criteria for Releasing a Critical Service**

Anna Kamunen

University of Tampere  
School of Information Sciences  
Information Systems  
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Supervisor: Mikko Ruohonen  
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An IT Service is an information system run on a supported environment that meets specific quality requirements. Service management, an integrated process approach enables the controlled delivery of live services that satisfy the customer's expectations. The ITIL framework offers best practices to manage the entire service lifecycle.

The case study organization Insta DefSec Oy provides a critical service that will be delivered in 2015 to be used in all Emergency Response Centers in Finland for handling 112 notifications. The requirements for availability and reliability of the ERICA service are high as it must be operational at all times and under various conditions.

This thesis work presents the service acceptance criteria incorporated with a RACI matrix and suitable metrics for releasing the ERICA service. Three professionals in the senior management evaluated the built artifacts. The results of the study indicate that the leadership regards downtime and uptime, response time and Mean Request for Change Turnaround Time as the most useful metrics. Another finding is that the professionals emphasize different metrics due to their expertise and position in the organization.

Key words: IT service management, ITIL, service acceptance criteria, metrics, release management, emergency response center, 112

## **Preface and Acknowledgements**

I am drawn to topics relating improvement and quality management, and I get excited about developing new things. IT Service Management is a rising practice in Finland. I look forward to seeing how the field develops, and to all the interesting assignments I get to take on professionally.

I would like to express my gratitude to my employer Insta DefSec Oy for supporting my studies. Balancing working life and personal development was more manageable by having a common goal. A special thank you to my superior and leader Mikko Pitkänen for the opportunities and encouragement I have received.

I would also like to thank the interviewees for their engagement in my work and for sharing their knowledge and insight with me. What a fortune to be surrounded by such accomplished professionals as you.

My appreciation goes out to Professor Mikko Ruohonen and Doctor Timo Poranen from the University of Tampere for guiding me academically and cheering me on. Thank you all, colleagues and friends, who have given me valuable feedback on the numerous thesis drafts over the past year.

Warm thanks to my family and friends! You have been my strength and joy in this endeavor and many others. Now it's time to celebrate.

Pirkkala, August 16<sup>th</sup>, 2013

Anna Kamunen

# Table of Contents

1	INTRODUCTION .....	6
1.1	Thesis Structure .....	7
2	SERVICE MANAGEMENT .....	8
2.1	ISO 20000 .....	11
2.2	COBIT .....	11
2.3	Quality Management.....	12
2.4	Continual Improvement .....	13
2.5	Quality Attributes .....	15
2.6	Risk Management .....	17
2.7	Information Security Management .....	17
3	INFORMATION TECHNOLOGY INFRASTRUCTURE LIBRARY .....	19
3.1	Service Design and Service Acceptance Criteria .....	20
3.2	Service Transition and Release Management.....	22
3.3	Continual Service Improvement and Measuring .....	22
4	RESEARCH METHOD .....	25
4.1	Design Science Research .....	25
4.2	Build and Evaluate.....	27
4.3	Case Insta DefSec Oy .....	28
4.4	The Role of the Researcher.....	28
5	EMERGENCY RESPONSE CENTER SYSTEM .....	30
5.1	Public Safety Answering Points .....	30
5.2	Authority Cooperation .....	31
5.3	Emergency Response Centers.....	32
5.4	The New ERC Information Service.....	33
5.5	Critical Service .....	34
5.6	Service Catalogue .....	34
6	SERVICE ACCEPTANCE CRITERIA AND METRICS .....	36
6.1	Service Development.....	36
6.2	Releasing.....	37
6.3	Service Acceptance Criteria.....	38
6.4	Metrics .....	39
7	EVALUATION .....	44
7.1	Interviews .....	44
7.1.1	Head Designer.....	44
7.1.2	Service Owner.....	46
7.1.3	Business Unit Director.....	47
7.2	Results.....	48
8	CONCLUSIONS .....	50
	REFERENCES .....	52

## List of Figures and Tables

Figure 1. Components of an IT service.....	9
Figure 2. The Plan-Do-Check-Act (PDCA) cycle of continual improvement. ....	14
Figure 3. The ITIL service lifecycle. ....	20
Figure 4. Continual service improvement from vision to measurements. ....	23
Figure 5. Information Systems Research Framework. ....	26
Figure 6. The handling of emergency entries and dispatching of emergency units in the Finnish ERCs. ....	31
Figure 7. The process of the Finnish ERC Operator for handling a 112 notification.....	32
Figure 8. The service catalogue of the Public Safety and Security business unit.....	35
Figure 9. The ERICA project roadmap for service releases. ....	38
Table 1. Checklist for Service Acceptance Criteria.....	39
Table 2. Total Downtime and Uptime. ....	40
Table 3. Response Time.....	40
Table 4. Number of Security Breaches.....	40
Table 5. Total SLA Violations.....	41
Table 6. Mean Time to Repair (MTTR). ....	41
Table 7. Mean RFC (Request for Change) Turnaround Time (MRTT). ....	42
Table 8. Number of Successful and Failed Changes. ....	42
Table 9. CI (Configuration Item) Data Quality. ....	43
Table 10. The three most useful metrics.....	49

# 1 INTRODUCTION

The service provider carries the risks and responsibilities on behalf of the customer in releasing a service. Since the customer is subscribing to applications, infrastructure and environment all in one without having control over them, they place their trust on the delivering company's ability to provide an agreed-upon service and thrive for excellence. In order to successfully release and operate the new Finnish Emergency Response Center Information Service ERICA, the provider Insta DefSec Oy is designing the upcoming services in concordance with the IT Service Management best practices. ITIL is used as the main framework in this thesis.

The provider of ERICA intends to prove to their customer and to themselves that the outcome will meet the needs and expectations of the customer of a high performing and reliable service. This aspiration is even more important since the achieved service level will affect the population of an entire nation who rely on the emergency services being operational and effective at all times and under various conditions. The upcoming service is used for running 112 operations in every Emergency Response Center in Finland. Hence the availability requirement for the service is 99,996% as stated in the initial Service Level Agreement.

Releasing is a pivotal stage in delivering software. It holds financial implications and often inflicts intensive efforts in the providing organization. Releasing a service with grace is more complex than handing over a software product "in cellophane". It is the point when the customer satisfaction is either won or lost.

The leadership of the Public Safety and Security business unit in Insta has commissioned for the design of service acceptance criteria and suitable metrics to ensure the quality and release readiness of the service version. With these actions the leadership draws attention to diligent release preparation and consistent monitoring. The management's main objective is to assess the availability, security and effectiveness of the service and be able to base their decisions on the results of suitable metrics. The designed artifacts will provide the necessary steps to the deployment of ERICA into live operation scheduled in 2015.

## **1.1 Thesis Structure**

The service management standards and frameworks are introduced in chapter two. As service management is based on quality disciplines, the quality management principles and suitable service quality criteria are investigated. At the end of the chapter some consideration is placed on relating issues such as risk management and information security management. In chapter three the ITIL framework is covered with the focus on service acceptance criteria, release management and measuring.

The selected Design Science Research method and the build and evaluate approach are presented in chapter four. The case study takes a look at the service provider Insta who are shifting into service business. The public safety domain and the ERICA service are explained in chapter five to give the reader a better understanding of critical services. The design of appropriate service acceptance criteria and metrics are introduced in chapter six. Chapter seven contains the evaluation of the built artifacts. The opinions and viewpoints of the interviewed professionals working in the ERICA service leadership are enclosed. Conclusions are deliberated in chapter eight.

## 2 SERVICE MANAGEMENT

A service is defined as

“a means of delivering value to customers by facilitating outcomes customers want to achieve without the ownership of specific costs and risks”

by ITIL Version 3 [Cabinet Office, 2011a]. A service is produced and consumed at the same time, and in contrast to a product it is intangible [van Selm, 2008]. A digital service is more restrictive than other services as their delivery method requires digital transactions and computers. Digital services are intangible in the sense that they cannot be touched. The ownership of digital services is more subtle than in normal services as they entail digital rights for a certain purpose. [Hevner and Chatterjee, 2010]

An IT Service comprises an information system and quality specifications as shown in Figure 1 below. An information system can only be provided as a service with adequate support. A knowledgeable staff (depicted as People in the figure) provides and maintains the service to meet the required specifications by means of documented processes (depicted as Documentation in the figure). The information technology components of the service include the facilities and the applications run on the technical infrastructure. The technical infrastructure consists of physical hardware and the containing system software as well as networks. Application software and databases are elements whose performance is dependent upon the underlying hardware. [van Selm, 2008]



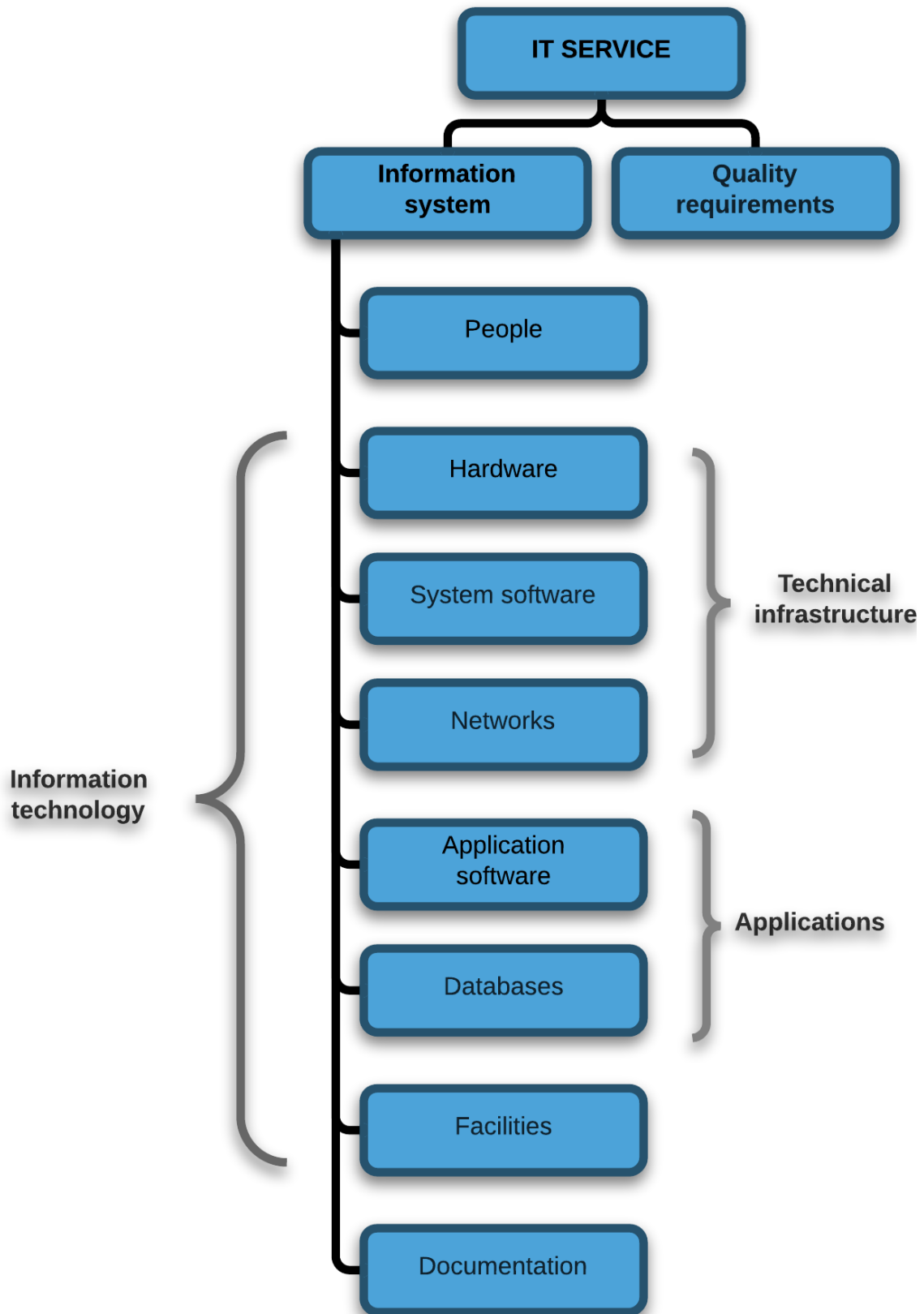


Figure 1. Components of an IT service [van Selm, 2008].

Software as a Service (SaaS) is a delivery model in which centrally hosted applications are provided on demand to multiple customers. Typically users access the applications

over the Internet but not always. The provider holds more domain and application expertise than in the preceding application service provider (ASP) model. Betz has estimated that purpose-built applications are slow to come online and are expensive to maintain. [Betz, 2011]

The Software as a Service model moves the focus from owning application software and delivery infrastructure to using them as remotely managed services. The business model offers four value drivers: efficiency, complementarities, lock-in, and novelty. Benefits to the customer include frequent and free upgrades, access to software applications at any time and from anyplace, and being able to focus on their core competencies while having access to technical expertise. The service aspect of the software business presents benefits to companies offering SaaS services such as including scale economies in both production and distribution costs, expansion of the potential customer base, more predictable cash flows, and shortened sales cycle. [Lassila, 2006]

Benlian and Hess conducted a survey on hundreds of IT executives among SaaS-adopters and non-adopters on the risks and opportunities of Software as a Service. Their findings are similar to previous studies on on-demand software: security and performance risks rise to the top of the list while cost advantages are the main perceived benefit. The writers suggest that SaaS providers use reference cases to show their ability to provide excellent and secure services. Some practitioners and researchers predict that difficulties in deployment may hinder the popularity of the SaaS model. [Benlian and Hess, 2011]

As the objectives of the business become a priority, more attention is paid to the management of IT services rather than just the development stage. An information system can reach the goal of supporting business needs only when the system is available to users, supported by maintenance and operational management in case of faults or need for modifications. IT Service Management (ITSM) is an integrated process approach that enables the delivery of live services that meet business and customer requirements. [van Selm, 2008]

In order to design and improve service management processes organizations can lean on ITSM frameworks such as Information Technology Infrastructure Library (ITIL) or a more governance-oriented Control Objectives for Information and related Technology

(COBIT). Organizations aiming for certification should furthermore adopt the requirements of the ISO/IEC 20000 standard.

## **2.1 ISO 20000**

A standard defines an agreed-upon repeatable way of doing things and includes a formal specification. It also prescribes a minimum set of practices and mandatory controls for the organization. Best practices on the other hand only provide suggestions and guidance based on a proven way of completing tasks shown over time by a large number of organizations. [Knapp, 2010]

ISO/IEC 20000 is the first international standard series in the IT Service Management domain published in 2005 and revised in 2011. It can be used by organizations as a basis for a self-assessment or to benchmark their IT Service Management [van Selm, 2008]. Service providers can prove their compliance against the standard ISO/IEC 20000 through certification. The certification does not guarantee a quality service but rather that the organization has effective ITSM processes. [Knapp, 2010]

As a quality standard the ISO/IEC 20000 requires evidence of both intentions - produced as documents, and activities - produced as records. ISO/IEC 20000-1 contains the requirements, the “shall”, for delivering managed services of acceptable quality to the customers. According to ISO 20000-1 the service provider shall implement the Service Management plan, which includes policies and plans, service level agreements, documented processes and procedures and records. [van Selm, 2008] ISO/IEC 20000-2 describes the best practices, the “shoulds”, to create and improve service management processes. [Knapp, 2010]

## **2.2 COBIT**

Corporate governance of IT is a system by which the current and future use of IT is directed and controlled as defined by ISO/IEC 38500 Corporate Governance of Information Technology. COBIT is an enterprise governance framework that enables IT to be governed and managed in a holistic manner for the whole enterprise. The five core principles of COBIT 5 are: meeting stakeholder needs; covering the enterprise end-to-

end; applying a single, integrated framework; enabling a holistic approach and separating governance from management. [de Haes *et al.*, 2013]

COBIT has its origins in the audit community and there is a particular connection between the framework and the conduct of IT assurance. COBIT currently aims at being an umbrella of various standards and frameworks, including ITIL. The emphasis is however changing from process maturity towards the concept of process capability assessment. The framework nowadays leans more on the ISO/IEC 15504 standard, also known as SPICE, whereas past editions of COBIT were influenced by CMMI (Capability Maturity Model Integration). [de Haes *et al.*, 2013] CMMI introduces five maturity levels helping organizations determine which maturity level is achieved and what actions must be taken to advance step by step. SPICE (Software Process Improvement and Capability Determination) provides guide for performing capability assessment to improve the organization's processes in relations to their goals. [van Selm, 2008] The newest edition COBIT 5, published in 2012, offers more support for implementing the framework, which has according to studies been the main interest of enterprises using COBIT [de Haes *et al.*, 2013].

## **2.3 Quality Management**

Quality refers to the correctness or appropriateness of an activity. According to Juran it is 'fitness for use' and customer satisfaction. In quality management systems quality is seen as conformance to requirements, as defined by Crosby. [Breja *et al.*, 2011] In software engineering quality also encompasses the absence of defects and timeliness - the system's ability to meet deadlines in reference to execution time [Gumzej, 2010].

The quality management aspects presented in ISO 20000 are adopted from ISO 9001. The eight quality management principles are:

- 1) Customer focus,
- 2) Leadership,
- 3) Involvement of people,
- 4) Process approach,

- 5) Continual improvement,
- 6) Factual approach to decision-making,
- 7) Mutually beneficial supplier relationships and
- 8) System approach to management. [van Selm, 2008]

Customer focus means the understanding of customer needs and expectations. The end-user must be distinguished from the paying customer. However the end-user interacts with the service and thus is central in forming the customer satisfaction feedback. People are essential in managing quality. The leadership directs and motivates the entire staff working towards clear goals. Organizations are dependent upon their suppliers. In these relationships the aim is to create value for both participants cost-effectively. [van Selm, 2008]

A process is a structured set of activities designed to accomplish a defined objective. A process has inputs deriving from customer requirements, which are turned into outputs to gain customer satisfaction. Through managed processes organizations can attain consistent and predictable results. The processes are managed most effectively as a unified system. [van Selm, 2008]

RACI (Responsible, Accountable, Consulted, Informed) model is a responsibility assignment matrix that provides clear definitions of accountability and responsibility in relation to processes [Cabinet Office, 2011c]. The traditional RACI matrix can be extended by an additional V for Verified (output) and an S for (the verified output being) Signed off [Knapp, 2010]. COBIT 5 provides RACI charts in which processes are assigned to both business and IT roles [de Haes *et al.*, 2013].

## **2.4 Continual Improvement**

Continual improvement is commonly represented by the Plan-Do-Check-Act cycle (PDCA) also called as the Deming's cycle (Figure 2). Deming's thinking emphasizes knowledge and learning which lead to transformation. Total quality management (TQM) is a quality management framework or a business strategy aiming at business excellence through continual improvement. [Breja *et al.*, 2011]

The PDCA cycle's four stages stand for:

Plan	establishing the objectives and processes to deliver results
Do	implementing the processes
Check	monitoring and measuring the processes, and reporting the results
Act	taking actions to continually improve process performance. [Cabinet Office, 2011c]

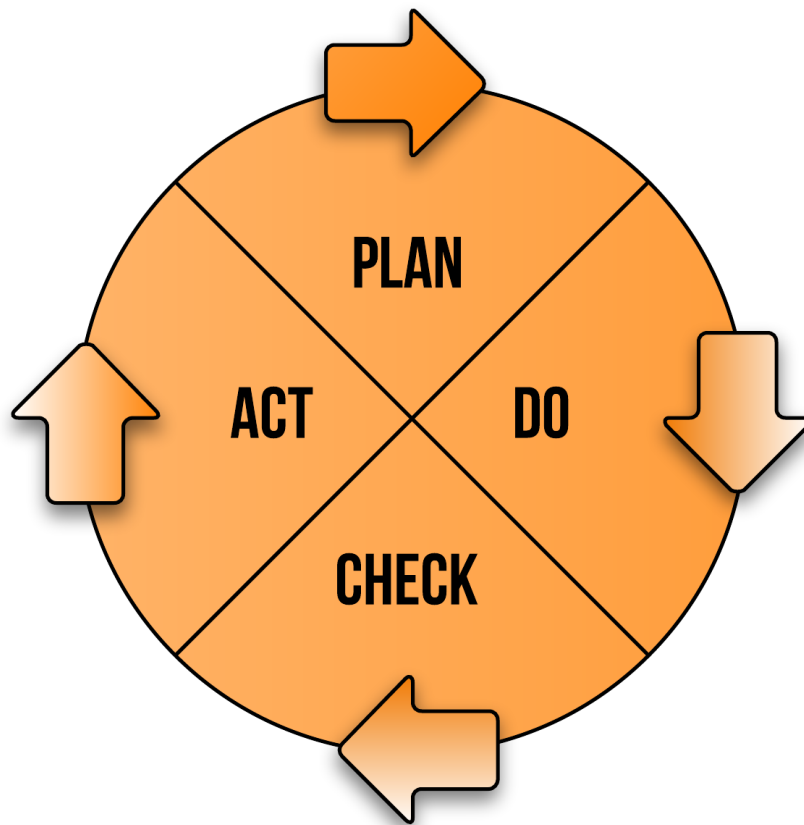


Figure 2. The Plan-Do-Check-Act (PDCA) cycle of continual improvement.

In order to check the process a starting point, a baseline, is first measured. Measuring and monitoring is conducted for several reasons: to validate previous decisions, to direct the course of actions towards the set goals, to justify actions with factual evidence and to intervene if corrective measures are shown to be necessary. ITIL's continual service improvement activities include:

- Reviewing management information and trends to ensure that services are meeting agreed service levels,
- Conducting maturity assessments against process activities and roles associated to demonstrate areas of improvement,

- Reviewing existing deliverables for relevance and
- Conducting periodic customer satisfaction surveys. [Cabinet Office, 2011c]

## **2.5 Quality Attributes**

The service is delivered to the customer against an agreed quality. This calls for specified and agreed quality attributes of a service. The quality of a service is according to van Selm [2008] expressed in specific characteristics of a service that satisfy customer's expectations. The most commonly accepted characteristics are, in order of importance:

- 1) Availability,
- 2) Capacity,
- 3) Performance,
- 4) Security,
- 5) Confidentiality,
- 6) Scalability,
- 7) Adjustability and
- 8) Portability.

Availability is the proportion of time the system is in a functioning condition. It also represents readiness for correct service. [Gumzej, 2010] Highly available systems are designed to recover from failures without unacceptable disruption to the service. Availability is expressed as a percentage. Practically 99,999% availability or “five 9’s service availability” means the service downtime should not exceed 5 minutes per year. [Bauer, 2010]

Capacity is the amount of (often physical) resources required to meet the demands of the customer's needs, such as storage capacity of a disk and processing capacity of a CPU [van Selm, 2008]. Security is the degree of protection against the consequences of failures caused by the environment of a system. It's a sum of availability, confidentiality

and integrity - the absence of improper system state alterations. [Gumzej, 2010] Confidentiality is the system's protection against unauthorized disclosure of information. As an element of security the importance of confidentiality depends on the nature of the customer's business [van Selm, 2008].

The last three quality characteristics are defined by the system's design. A service needs to be scalable and adjustable in order to be maintainable in the long run. [van Selm, 2008] Portability is the degree of effort needed to port a (software) system into a new environment or platform. Portability is a part of maintainability, which describes the system's ability to undergo repairs or modifications. [Gumzej, 2010]

The quality attributes listed above are useful especially for the purposes of continual service improvement. However, it must be noted that services can only be measured after they have been delivered. Due to the dependency on the user's interaction with the service, customer satisfaction cannot be determined in advance or based on calculations. [van Selm, 2008] Availability and response times are measurable, in terms of automated monitoring, whereas customer satisfaction has a limited measurability [Paschke and Schnappinger-Gerull, 2006]. To investigate the perceived quality of a service, qualitative methods are more revealing whereas quantitative metrics are better suited for measuring and improving the service management system.

Real-time systems software must be designed and evaluated together with the underlying hardware. An embedded software system is a *hard* real-time system. An IT service is a type of *soft* real-time system. Mean times can be only applied to soft real-time systems and even then they cannot predict the future happenings. Gumzej presents quantitative criteria such as Mean Time Between Failures (MTBF), Mean Time to Failure (MTTF), Mean Time to Recover (MTTR) and capacity reserves. Capacity reserves criteria assess the timeliness in contrast to available physical components, which produce the response times. These form reliability, the degree of a system's ability to perform its required functions under stated conditions in a specified period of time. [Gumzej, 2010]



## **2.6 Risk Management**

Risk management is essential in relation to a service management system since the service provider takes ownership of the costs and risks for the customer as stated by the ITIL's definition of a service. Nevertheless the ITIL processes do not include a dedicated risk management process, which has raised discussion on whether the framework holds enough value on managing risks. The risks are however considered within processes throughout the service lifecycles. Some experts in the field of ITSM prefer this approach since it draws attention to risk management in a more comprehensive way than if it were a separate process.

For further guidelines on managing risks ITIL advises the practitioners to consult the risk management standard ISO 31000:2009 or Risk IT, the ISACA framework for complementing COBIT 5 that covers risks in service delivery among other things [ISACA, 2013]. The specification in ISO 20000-1 states that identifying and managing risks to the service are at the management's responsibility. [van Selm, 2008]

De Haes *et al.* [2013] state that while IT plays an important role in mitigating enterprise risk, information technologies also create risks such as potential monetary losses, reduction in operational capability and losses to enterprise reputation. These stand true for service business too, especially as the responsibility lies more on the provider's end whereas the customer's means to influence the service operations are limited.

## **2.7 Information Security Management**

Information security is determined as an entity that includes operational processes and people as well as the security and safeguarding of information material and information systems. Government Information Security Management Board (VAHTI) is the body responsible in Finland for co-operation, steering and development in the area of central government information security. The board produces comprehensive instruction and recommendation material over the entire field of information security for the central government's use. They are also applicable to other organizations, especially those who provide information systems whose integrity, availability and confidentiality are important. National Board of Economic Defense classifies these as 'Group 1' -

important information systems, whose information security and recovery preparedness must be on a high level. [VAHTI, 2009]

Government Information Security Management Board recommends that senior management integrates risk management as part of management activity and includes information security as part of risk management [VAHTI, 2009]. The ISO/IEC 27000 standard series sets the requirements for Information Security Management. ITIL Service Design publication ties information security to business security and business needs. To meets its objective Information Security Management processes should address the principles of confidentiality, integrity, availability and authenticity and non-repudiation. [Cabinet Office, 2011a]

### **3 INFORMATION TECHNOLOGY INFRASTRUCTURE LIBRARY**

Information Technology Infrastructure Library (ITIL) is the most widely spread best practices framework for IT Service Management. ITIL Version 3 offers guidance in an integrated service management system that is organized in five stages throughout the service's lifecycle:

- 1) Service strategy,
- 2) Service design,
- 3) Service transition,
- 4) Service operation and
- 5) Continual service improvement. [Cabinet Office, 2001a]

Each stage is interdependent of other stages and the processes are linked to allow information to flow across them. The policies and principles guiding the whole lifecycle are established during Service Strategy. In this lifecycle stage the service portfolio is defined, containing chartered new and changed services. Service Design stage prepares the transition and operating of services. Service Transition stage ensures that the designs are effectively realized before the service goes operational. Value is realized during Service Operation stage, which carries out the delivery of the service. Continual Service Improvement enforces an ongoing seven-step improvement process, which engages all activities and processes in every stage. [Cabinet Office, 2001a]

The ITIL service lifecycle phases can be mapped to the Plan-Do-Check-Act cycle, in which the Service Strategy and Service Design represent the Plan phase. Service Transition and Service Operation stages are corresponding to the Do phase. Continual Service Improvement encompasses the PDCA cycle's Check and Act phases, although each stage is improved within itself also. [van Selin, 2008]

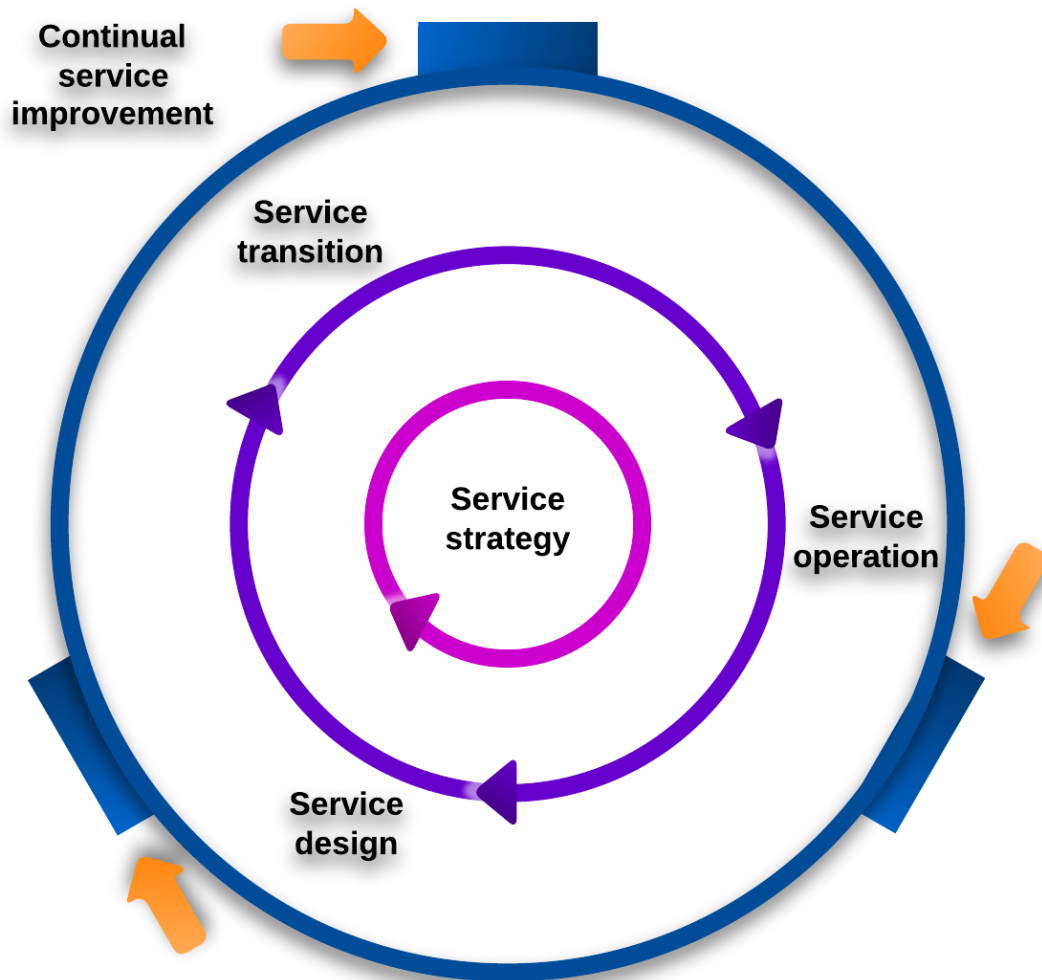


Figure 3. The ITIL service lifecycle [Cabinet Office, 2011a].

An IT steering group (ISG) is a committee of senior managers who make sure decisions concerning the service portfolio are consistent with corporate vision and objectives. Another key stakeholder in a decision-making role is the service owner or service manager, a senior manager responsible for the overall service. Several other management roles need to be put in place to manage the functions during the entire service lifecycle. [Cabinet Office, 2011a]

### 3.1 Service Design and Service Acceptance Criteria

The objective of the Service Design stage is to introduce the services into supported environments and ensure the quality service delivery and customer satisfaction. The success in this stage will result in minimal improvement during the rest of the service's lifecycle. The five design aspects are:

- 1) Service solutions for new or changed services,
- 2) Management information systems and tools,
- 3) Technology and management architectures,
- 4) Required processes and
- 5) Measurement methods and metrics. [Cabinet Office, 2011a]

The main output produced in the Service Design stage of the service lifecycle is the service design package (SDP). It contains all the design solutions needed in the following Service Transition and Operation stages. An availability plan ensures that availability requirements for existing and future services can be provided cost-effectively. A capacity plan manages the resources required to deliver the services.

The service catalogue is public to the customer and it includes all live IT services and those available for deployment. Service level requirements (SLR) are the customer's expressed expectations for future and new services. The requirements are formed into a contract, the Service Level Agreement (SLA), which defines the level, scope and quality agreed with the customer for an existing service. [Cabinet Office, 2011a] A well-defined and effective SLA fulfills the expectations of both participants, stating the customer's requirements and the provider's responsibilities. The contract provides metrics for measuring performance to the guaranteed service level targets and can be used to detect violations to the promised service levels. [Paschke and Schnappinger-Gerull, 2006] In the service report the agreed service level is compared to the achieved service levels and the results are presented regularly to the customer. The report includes information on the usage of services, any exceptional events including SLA violations and measures for service improvement. [Cabinet Office, 2011a]

The Service Acceptance Criteria (SAC) are defined at the Service Design lifecycle to ensure that the service meets its functionality and quality requirements. They are a set of criteria used for service acceptance testing and to prove that the service provider is ready to operate a new service when it has been deployed. The criteria suggested by the ITIL framework are not a detailed set of criteria by any means; rather each organization has to find suitable criteria to fit the particular service. In effect, they function as a checklist for outputs that have to be completed. [Cabinet Office, 2011a]

ITIL's Service Acceptance Criteria template offers a set of questions such as

"Can all SLA/SLR targets be monitored, measured, reported and reviewed, including availability and performance?"

This question cannot be answered without metrics that measure availability and the performance. Metrics however are not a part of the ITIL's SAC template but organizations are advised to define metrics to show how efficient the service design is as a part of quality assurance planning and release acceptance. [Cabinet Office, 2011a]

### **3.2 Service Transition and Release Management**

Service Transition presents best practice for the quality assurance of new or changed services. The principles drive for early involvement in the service lifecycle and quality improvement through anticipating and managing course corrections. Stakeholder relationships are established and maintained through providing systems for knowledge transfer and decision support. [Cabinet Office, 2011b]

Release management determines whether a new release affecting the service in production is ready for promotion. Service Transition stage develops and tests the monitoring procedures and criteria used during and after implementation. Release and deployment management is responsible for moving changes into the live environment. A release package is planned in advance and the release policy includes the exit and entry criteria for the acceptance of a release. The period before the handover to the Service Operation is called early life support, during which the two stages overlap and the separate staff teams collaborate. Release management is concerned with a larger scope than the change management process, which handles Requests for Change (RFC). There are normal and standard changes, and emergency changes accepted by the change advisory board (CAB). [Cabinet Office, 2011b]

### **3.3 Continual Service Improvement and Measuring**

The Continual Service Improvement stage introduces a seven-step improvement process that tracks the performance of the service throughout its lifecycle. First, the strategy for

improvement is established. The organization must consider and determine what it wants to measure. After gathering and processing the data, the information is analyzed. Information is then presented and finally used to implement the improvement. [Cabinet Office, 2011c]

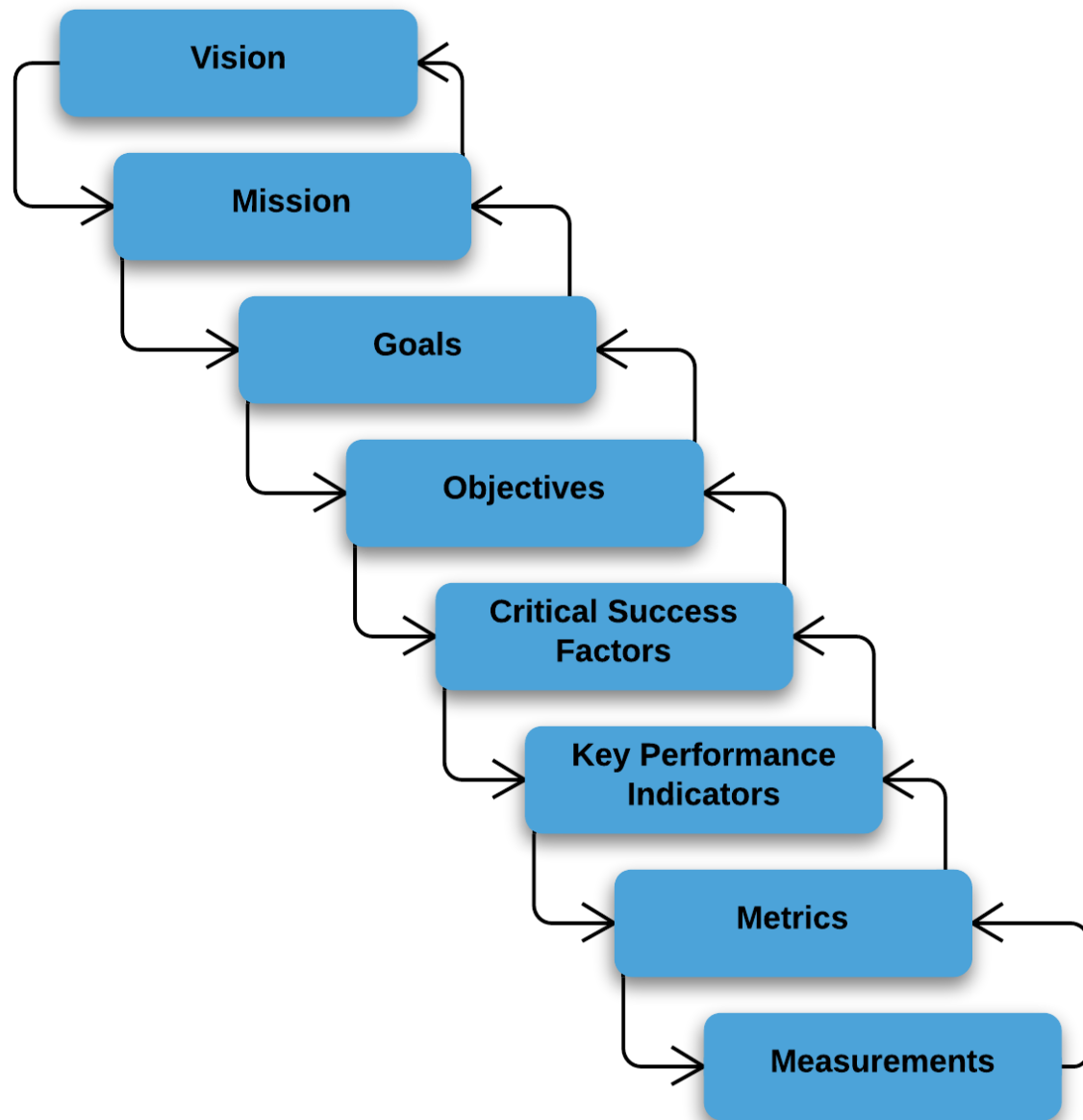


Figure 4. Continual service improvement from vision to measurements [Cabinet Office, 2011c].

The improvement process trails the results of the measurements back to the business objectives and all the way to the vision (Figure 4). The statements are revised iteratively as the process produces knowledge. A well-stated vision is focused on a state-of-the-art service that enables cost-effective and quality operations. [Cabinet Office, 2011c] A critical success factor (CSF) reflects the core objective of the process and supports the business goals. CSF is a measurable characteristic that must exist in a successful

process. A key performance indicator (KPI) is a key metric, a performance measure, to manage a process. [Knapp, 2010]

Monitoring and measuring process deliverables ensures that they are 'fit for purpose' and at the appropriate level of quality. The four types of metrics are:

- 1) Progress,
- 2) Compliance,
- 3) Effectiveness and
- 4) Efficiency.

ITIL suggests that metrics are developed with time as the service management processes mature. It is best to start with measuring progress and compliance to business requirements and then move on to measuring accuracy and productivity. [Cabinet Office, 2011a] Consistent ways of gathering and analyzing the data, and presenting information to top management are the service scorecard (for point in time information) and service dashboard (for real time metrics) [Cabinet Office, 2011c]. Trend analysis is based on the Balanced Scorecard in which the organizational performance is managed from customer perspective, internal process perspective, learning and growth perspective and financial perspective. [van Selin, 2008]



## **4 RESEARCH METHOD**

The study is conducted using qualitative research methods, which are best suited for the purpose of improving the organization's processes and decision-making abilities. The object of the empirical study is the acceptance of a service release from a managerial decision-making point of view. The study suggests service acceptance criteria and a set of metrics that are evaluated by the management. By carrying out interviews the management's objectives and priorities are gathered and incorporated into the results. The target organization of the case study is Insta DefSec Oy, the provider of the new Finnish emergency response center information system, and more precisely the business unit Public Safety and Security.

### **4.1 Design Science Research**

Design Science Research is a form of research where designing an artifact is used as a research method. Design is the purposeful organization of resources to accomplish a goal, and it is central in the work of Information Systems practitioners. The artifact is created in an organizational context to solve a problem. Design in field of Information Systems also has the meaning of a set of activities, a process, which is carried out by the innovative problem-solving cycle. [Hevner *et al.*, 2004]

The IS Research Framework combines behavioral-science and design-science paradigms. Figure 5 represents the components of the framework relevant to this study and premised more on the design-science approach.

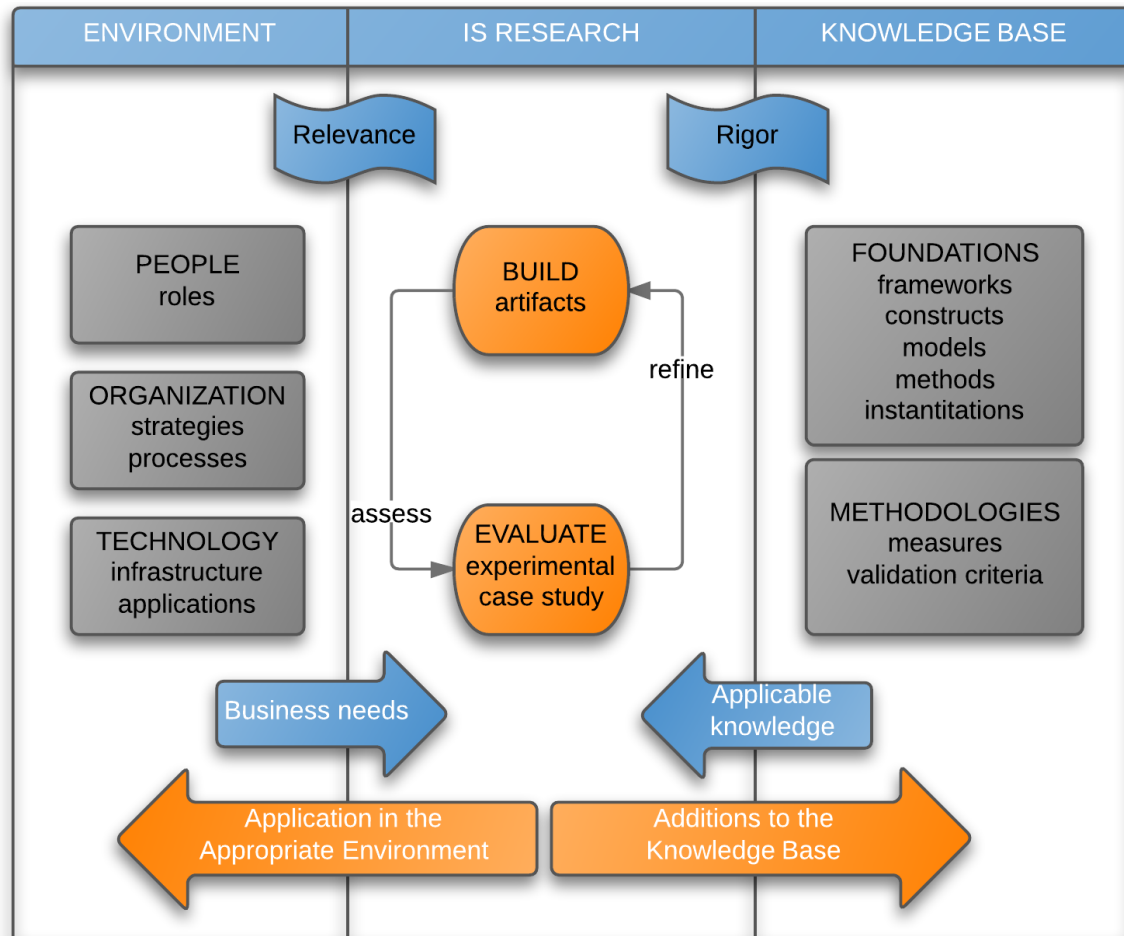


Figure 5. Information Systems Research Framework [Hevner *et al.*, 2004].

The environment consists of people in different roles, the organization's strategies and processes and technologies. The relevance of the research is assured by addressing the business needs. The goal of design-science is utility. To determine whether this goal is reached an evaluation of the artifacts is conducted through a case study and experimental methodologies. In design science empirical methodologies are used in addition to or instead of mathematical methods. Rigor is achieved by applying the foundations and methodologies. Foundation includes frameworks and the basic artifact types: constructs, models, methods and instantiations. [Hevner *et al.*, 2004]

The contributions of the research are produced and assessed in an appropriate environment by applying them to the business needs. The findings add to the knowledge base, which becomes the baseline for further practice or research. The knowledge base forms in time a best practice artifacts base that is valuable to the organization. [Hevner *et al.*, 2004]

## 4.2 Build and Evaluate

Design Science Research approach consists of two processes: build and evaluate. The artifact designed in this thesis work is the service acceptance criteria, which is a part of the service design package. It can be thought of as a management tool for providing a means of creating suitable service acceptance criteria and meeting the business needs. The initial artifact is evaluated and changes are welcomed to improve its usefulness [Vaishnavi and Kuechler, 2004].

The Design Science Research method was chosen for its flexibility and comport with continual improvement, a process essential in organizational advancement. The design science convention is constantly stretching out to new unsolved problems. ISO/IEC 20000 standard and ITIL service lifecycle approach are based on the Plan-Do-Check-Act (PDCA) cycle. In order to truly apply the ITIL's continual service improvement model, the business improvement tool (the design artifact) needs to be concurrently improved through build and evaluate processes.

Evaluation is a crucial phase in the design science research process. All evaluation begins with a need to know. There are various reasons for evaluation studies:

- 1) Promotional,
- 2) Scholarly and
- 3) Practical.

Promotional motivation increases the adoption and use of information systems in organizations by showing they are safe, reliable and cost-effective. The scientific principle calls for re-examination of how well the design has been evaluated and compared against other existing similar systems. Practically speaking evaluation adds to the body of knowledge for future use. It reveals to designers what methods are effective, or why certain approaches fail. [Hevner and Chatterjee, 2010]

The first build and evaluate cycle of the designed artifact is presented in this study. The evaluation of the built artifact was conducted through interviews during the service design phase of the service lifecycle. The goal of the evaluation is gathering knowledge of the values and priorities of the management and improving the artifacts. The

implementation of the metrics will be conducted later, after the selection is approved. The effectiveness of the metrics is considered again when the results are available and interpreted.

### **4.3 Case Insta DefSec Oy**

Emergency Response Centre Administration (ERCA) in Finland decided to acquire a new information system to replace the current system at the end of its lifecycle. Insta DefSec Oy was selected as the provider in 2011. In 2015 the new emergency response center system ERICA will be delivered as a service after the proposition by Insta.

ERICA is a pilot project in Insta as the company transitions from project and product businesses into service delivery business. Service business offers larger prospects than the traditional project business. In order for the company to grow from a national giant to an even bigger player it has to aim at the international market. Insta operates in the role of a service integrator in the Finnish ERICA project. In the prospective international projects the company may well work alongside a local integrator and bring its expertise in delivering large-scale, critical solutions.

In the strategy of Insta there is an objective to grow in service management, which is a relatively new business model for delivering critical systems. The adoption of service management principles and standards needs to be well thought-through and executed when doing business in the public safety and security domain. The organization is deeply grounded in the ISO 9001 practices. As a service provider it will also adopt ISO 20000 and ITIL best practices. To manage risks the company applies the AQAP-2110 standard in all projects within each business unit. The standard requires procedures for risk identification, risk analysis, risk control and risk mitigation [Nato Standardization Agency, 2009].

### **4.4 The Role of the Researcher**

The thesis writer's experience of five years in Insta consists of software development for critical systems and operating as a Scrum Master in the ERICA project during three releases. She currently works as a Service Manager and also manages a subproject in the ERICA project. This thesis provides support for the organization in developing the

service acceptance criteria and appropriate metrics in releasing service versions that are based on literary reviews and interviews as well as her experience in the field.

Engaged scholarship practiced in design and evaluation research “focuses on normative knowledge related to design and evaluation of policies, systems, and models for solving practical problems within a profession” [Conboy *et al.*, 2012]. As a practicing professional I have direct access to the problems relevant to both organization and research. However there is a distinction between design science research and professional design, which relies mainly on existing best practices. The trial and error approach create contributions to the knowledge base that can be communicated to the stakeholders. Design as science is often domain-specific whereas the other field of design study, researching design, is focused on design processes independent of context. [Hevner and Chatterjee 2010].

In researching digital services for emerging design patterns Hevner and Chatterjee used qualitative techniques such as observation, since services are not complete but rather built iteratively [Hevner and Chatterjee, 2010]. For me, being part of the organization it was easy to detect the stakeholders who could formulate the problem and should evaluate the design solutions.

## 5 EMERGENCY RESPONSE CENTER SYSTEM

The Universal Service Directive was issued in 2002 to ensure the adoption of a single European emergency number 112 throughout the union for the protection of the citizens. The Directive, which was updated in 2009, has the following requirements regarding 112:

- Calls are free of charge,
- Calls are handled regardless of the nationality of the caller,
- The caller can be located and
- Member states must inform citizens and travelers of the existence and use of 112 emergency number. [2009/136/EC]

There still remains work to be done with the member states imposing the related issues, especially caller location information [2009/136/EC]. The European 112 Day is one of the attempts to raise awareness of the common emergency number and it is spent on February 11<sup>th</sup> in the majority of member states [COCOM, 2013].

Finland is one of the four member states where '112' is the one and only emergency number [COCOM, 2013]. The parallel number 10022 for the police ceased after a transitional phase in 2011 [Viestintävirasto, 2011]. According to the Communication Committee report there are almost 3.7 million 112 calls made in Finland per year. 92% of the calls are answered within 10 seconds. [COCOM, 2013]

### 5.1 Public Safety Answering Points

Public Safety Answering Points (PSAP) receive the emergency calls and dispatch the emergency units accordingly. The Finnish PSAP system is organized as an *ERO independent PSAP Model*, in which PSAP call-takers are not Emergency Response Organizations' (ERO) specialists. According to EENA, ERO independency is a future trend in organizing European PSAPs. In the ERO independent PSAP Model there are no additional stages between the call in-taker and the dispatched unit, which enables shorter response times. In some other European countries the 112 handling chain is

longer when PSAPs forward the calls to local EROs. Other trends in the future are interconnected PSAPs (shared network and databases) and fewer and larger PSAPs. [Machado, 2013]

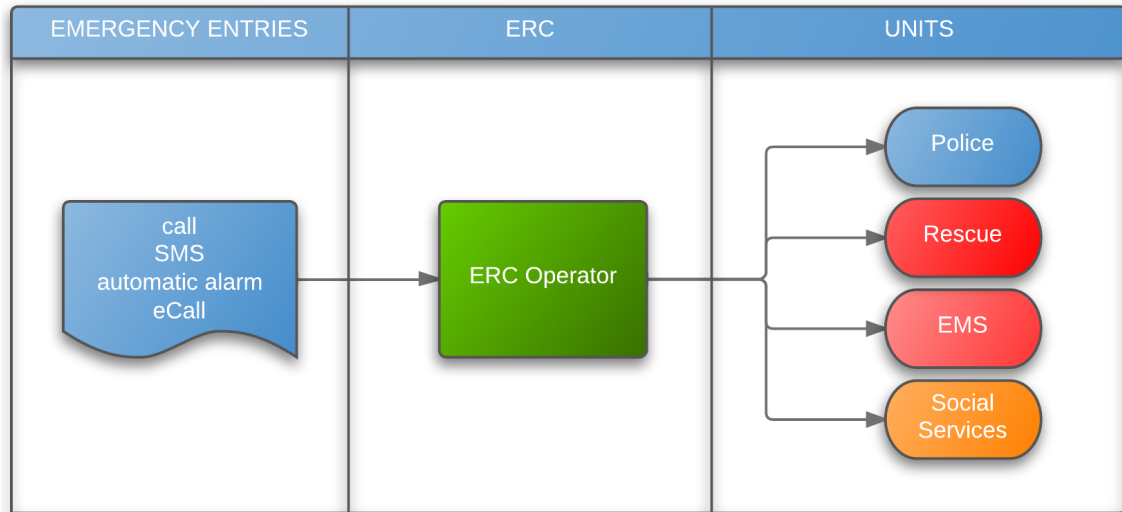


Figure 6. The handling of emergency entries and dispatching of emergency units in the Finnish ERCs.

In Finland the emergence response centers handle all types of emergency entries in one point with a unified process. In addition to 112 calls, help can be retrieved via SMS. Automatic fire and burglary alarms are processed in the ERC before dispatching appropriate units. The in-vehicle emergency call, eCall, includes the location of the occupant in a data message, which is helpful in case the person is unable to speak with the ERC operator or he or she cannot say where they are. [Aaltonen, 2012] The operators evaluate if and which emergency services need to be dispatched.

## 5.2 Authority Cooperation

An *ERO independent PSAP Model* is possible due to the legislative efforts in Finland. The joint operation of different emergency authorities has been purposefully aimed at for decades. The co-operating authorities sharing a common, centralized PSAP system are police and rescue, emergency medical services (EMS) and social services. The Finnish Defence Forces and Border Guard assist in rescue tasks whenever called for. Emergencies on Finland's sea areas are handled by the maritime rescue services of the Border Guard.

Co-operation of different sectors requires maintaining a common situation picture and centralized coordination in the field. According to the Rescue Act the officer in charge of the rescue operations is in overall charge during rescue operations where units of multiple authorities are needed [379/2011]. The Police Act states that the Police gives executive assistance and the commanding police officer can require assistance from other authorities during emergency operations they are involved in [872/2011].

### 5.3 Emergency Response Centers

In Finland the emergency services are at the responsibility of the Ministry of the Interior. Emergency Response Centre Administration Finland (ERCA) was founded in 2001 ushered by a new law to co-ordinate the joint operations of the authorities. Emergency Response Centers are the centralized PSAPs shared by all the authorities in Finland, except for the Åland Islands. [Ministry of the Interior, 2012] The number of emergency response centers will be reduced to six by 2014. [Hätäkeskuslaitos, 2013a]

In case of an emergency, it is crucial that appropriate help reaches the scene of the event as soon as possible. The 112 calls are handled by trained ERC operators with a process presented in Figure 7. The ERC operators serve both 112 notifiers and the emergency service units in the field. [ERCA, 2012]

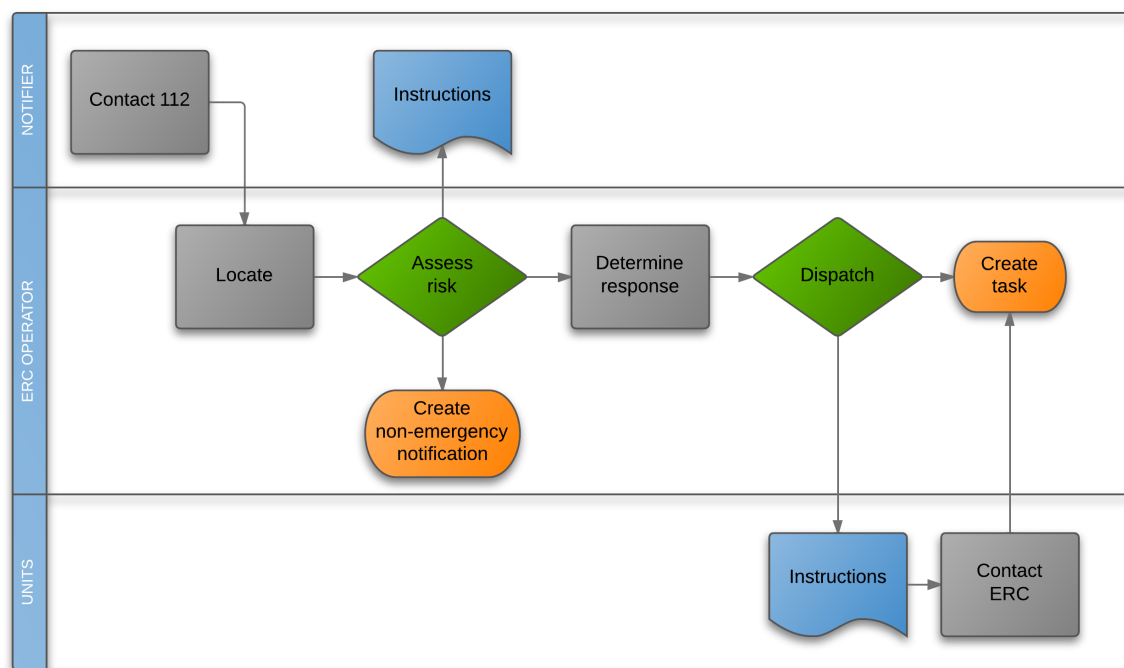


Figure 7. The process of the Finnish ERC Operator for handling a 112 notification.



When a citizen notifies of an emergency, the operator's first priority is to find out the location, most commonly a street address. The critical phase in the process is assessing the risk imposed on the person(s) in question. Depending on the situation the operator gives the caller first aid instructions or other advice. Unfortunately, approximately every fourth notification the ERCs receive is a false call [COCOM, 2013].

As the operator has ensured there is a real need for 112 services, he or she determines which units and what equipment should be sent to the scene of the event. The nature of the emergency determines whether the operator continues onto dispatching. [692/2010] Units respond to tasks depending on the urgency. Non-urgent tasks can be put on queue. The units can contact the ERC operator via radio or phone in case they need further information or need to rearrange the tasks.

## **5.4 The New ERC Information Service**

An efficient and extremely reliable information system is needed to aid the ERC personnel in the time-critical task of assessing the risk and dispatching the units. A new information system is in development and will be taken into operational use as a service in 2015. [Hätäkeskuslaitos, 2013b]

The objectives of the new service are:

- To uniform and enhance the emergency services,
- To ensure a fast and reliable location of the emergency event,
- To secure faster response times to emergencies,
- System reliability and usability,
- A national database for a common situation picture and
- Real time information flow between authorities. [Hätäkeskuslaitos, 2013b]

## **5.5 Critical Service**

An emergency response center service is critical to national security. The requirements of the new ERC service include high availability and reliability. The citizens must reach the emergency number under various challenging conditions. Typically storms cause a spike in the number of emergency calls in Finland. The lines can be busy and it takes longer for the ERC operators per call. The new service will be more capacity efficient and support the load balancing between local emergency response centers.

Another challenge for the operation of the ERC service is catastrophes. It is critical to form a common situation picture of what is happening in the region or nationwide. Emergency calls come in from several sources and the information is fragmented. The new service provides support for the ERC operators in identifying overlapping tasks, which could save resources when only necessary units are dispatched.

In the case of a critical system risk management is considered in all actions. The acceptance criteria and metrics suggested in this thesis provide the management with information to fulfill their monitoring and reviewing commitments and reveal uncertainties concerning the service's maturity, which in part assist in discovering risks.

The Information Policy and the Information Security Principles and Practices suggested by the Government Information Security Management Board (VAHTI) have been applied in Insta DefSec Oy at a corporate level for years. There is an ongoing preparation of an Emergency Preparedness Plan especially for the ERICA service including a recovery plan which ensures operational continuity under emergency conditions, for example during power failures.

## **5.6 Service Catalogue**

The service catalogue of Insta's Public Safety and Security business unit includes several independent services. Each service is provided under its own service level agreement (SLA). The core services are ERICA Reporting Service and ERICA Emergency Information Service. ERICA services are comprised of a set of supporting services and their configuration items (CI). The most critical supporting services customized to the customer's needs are Risk Assessment Service, Response

Determination Service and Location Service. The most important services are depicted in Figure 8.

CIS (Cautionary Information Service) entails a database of potentially dangerous people, vehicles and addresses connected to the rescue task. It is an enhancing service that is provided separately to be used alongside the current ERC system before the core ERICA services are released. CIS is eventually included in the ERICA Emergency Information Service. The releasing of ERICA Cautionary Information Service is an opportunity for the provider to apply in some degree the service acceptance criteria in praxis, as the service also has its own SLA.

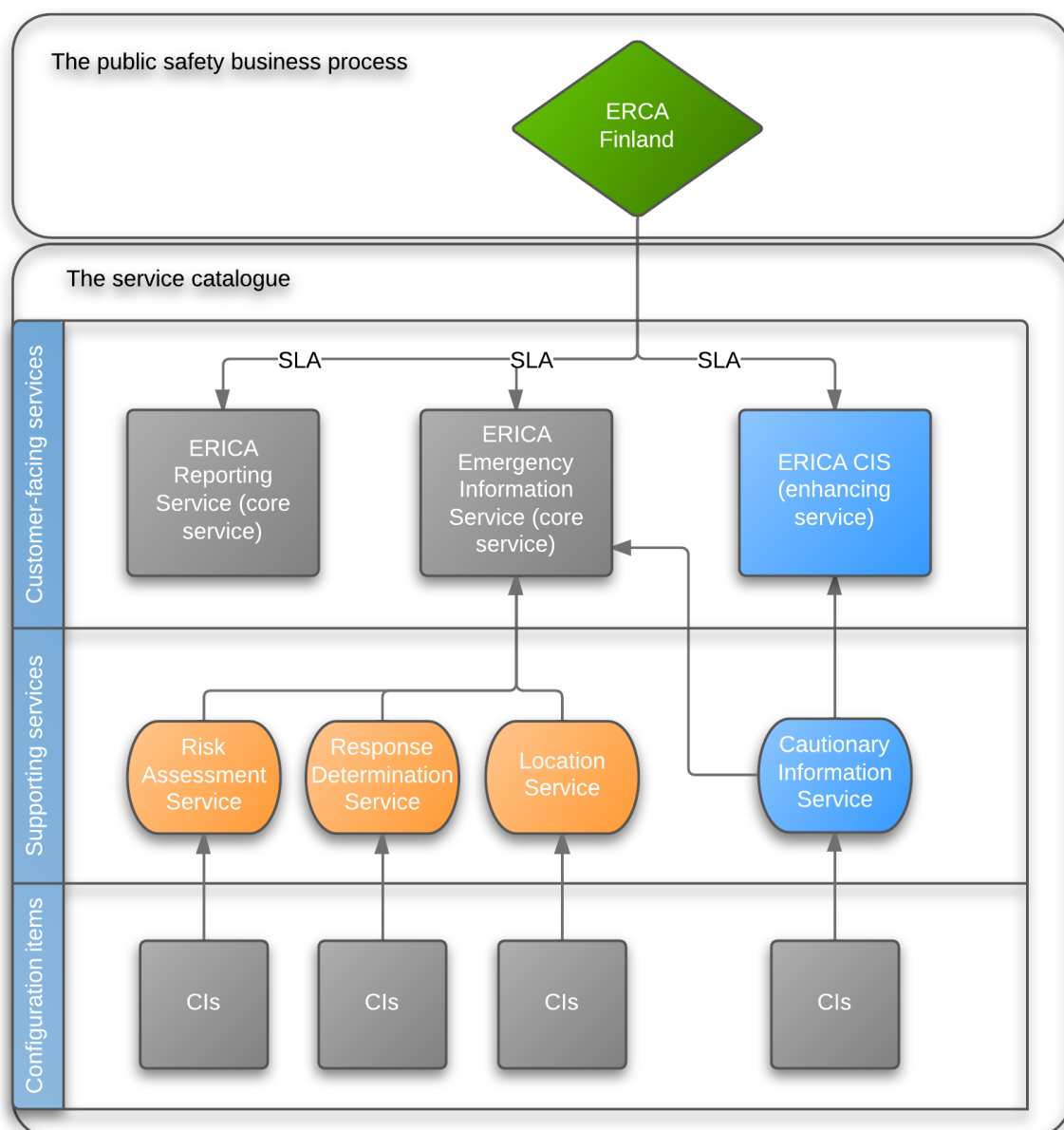


Figure 8. The service catalogue of the Public Safety and Security business unit.

## **6 SERVICE ACCEPTANCE CRITERIA AND METRICS**

The service acceptance criteria are a set of criteria used to ensure that the service meets the expected functionality and quality. They are developed and used in progression through each stage in the lifecycle in all environments. The objective is to assure that the service provider is ready to deliver the service once it has been deployed.

The service acceptance criteria consist of checklist of actions and outputs that need to have been prepared, supplemented by metrics for measuring the service level. The metrics are selected for the purposes of communicating the state of the service to the senior management and the quality assurance organization. The results will also be reported to the ERICA steering group consisting of members of the clients and provider's management.

The leadership is willing to subject the service under measurement while in development in order to prepare for the coming transition into operational use. The deployment stage of the final service is still years ahead which allows improvement of the metrics in several cycles. The objective is to select a baseline of metrics that can be measured throughout the developmental stages and can still be applied to the operational service producing a valuable trend along the years.

### **6.1 Service Development**

The thesis work is conducted during the development of the ERICA services. The service in progress consists of a tested version of the product under development that is run on a testing environment that resembles the operational environment as much possible.

The ERICA service is developed incrementally using the Scrum [Kniberg, 2007] software development method. The customer is closely involved in the two main lines of development:

- a) ERC application and
- b) infrastructure.

ITIL recommends that the application and infrastructure should be developed simultaneously in order to achieve a highly operational service [Cabinet Office, 2011a]. The quality requirements are met by both of these developmental pipelines in co-operation. The customer is presented with the progress of the projects each month, in sprints. The demonstrations allow for the customer to evaluate the results regularly. The customer has full access to the lab facilities where the latest version of the service is available for customer testing. This thesis does not cover the procedures within these two functions in the organization. Therefore the metrics are targeted at the service as a whole.

## **6.2 Releasing**

Service releases are delivered every six months. After the final sprint when the agreed-upon functionality is ready, the provider gets ready to deploy the release into the testing environment. The releases are not a release in the sense that it would be provided into operational use. However releasing during the design and development phase is a meaningful process in achieving the milestones towards an operational release and they hold financial implications.

The stages leading to the acceptance and deployment of a release are:

- 1) Two weeks of release testing by the provider,
- 2) Two weeks of acceptance testing by the customer,
- 3) Two weeks of repair time for the provider,
- 4) Deployment testing (in the operational environment).

ERICA service development timetable includes six releases, out of which the two last ones are run on the customers' environment under early life support as shown in Figure 9. Midway through the project the customer will start their training which increases the expectations for service availability and overall stability. It is noticeable that the design and transition phases are overlapping rather than consecutive. This is to promote fast deployment of releases. The Service Level Agreements will be finalized before the services go live. The first three months of the operational phase are dedicated to active monitoring. After fine-tuning a final release version is deployed into live operation.

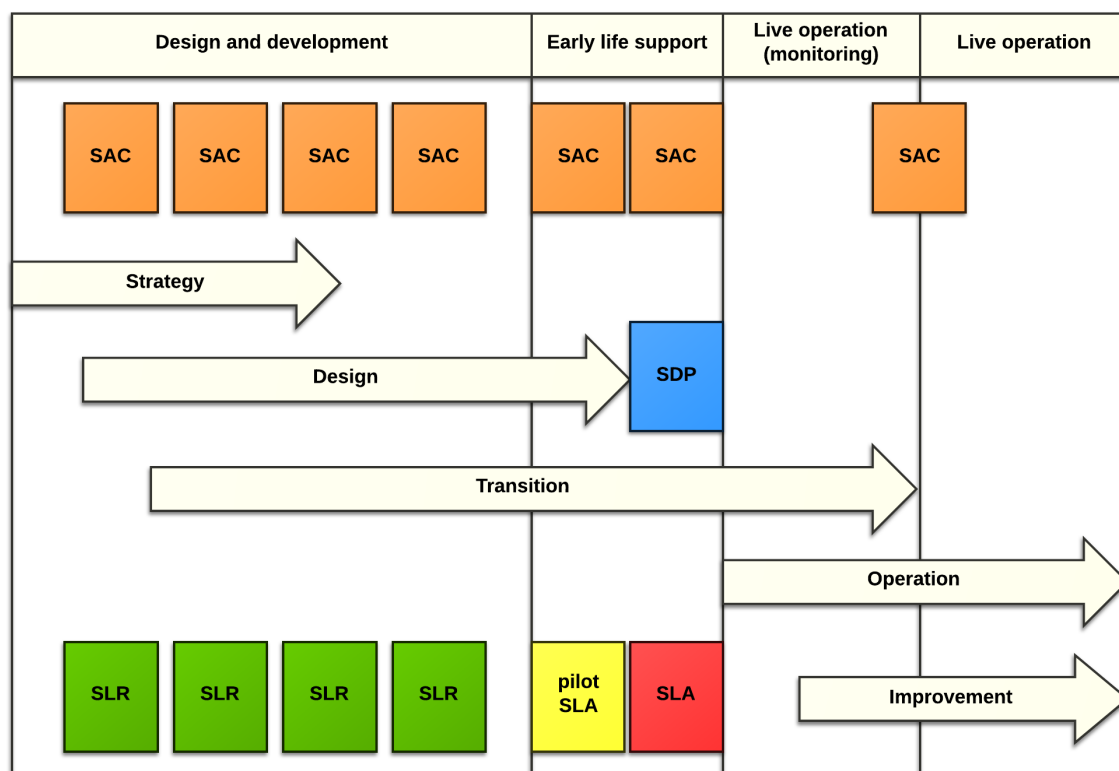


Figure 9. The ERICA project roadmap for service releases [Cabinet Office, 2011a].

### 6.3 Service Acceptance Criteria

The most appropriate SAC outputs and activities have been selected to form a checklist for releasing versions of ERICA service and they are presented in Table 1 below. To ensure that outputs will be produced in time to be assessed and with effect a RACIVS model is implemented. Each SAC task is at the responsibility of a role and knowledge is spread in the organization accordingly.

Table 1. Checklist for Service Acceptance Criteria.

	R	A	C	I	V	S
<b>SLA revisions</b>						
Tools for monitoring the service level						
<b>Capacity plan</b>						
Performance and capacity targets						
Contingency and fail-over measures						
<b>Test plans</b>						
Functional testing, non-functional testing, security						
<b>Incident and problem management</b>						
Incident and problem categories, known errors						
<b>Release plan</b>						
Go-live date and acceptance criteria						
Release records and schedule						
<b>Definitive Media Library (DML)</b>						
Software components, interfaces, dependencies						

## 6.4 Metrics

The metrics were selected on the basis of relevance to the leadership while making decisions about the acceptance of a release. The most important service level agreement (SLA) targets are:

- High availability,
- Security and
- Efficiency.

The following tables describe the selected critical success factors (CSF) that produce a top-level picture of the overall service quality assurance. The metrics can be used to improve the processes and this is more than desirable, and for this reason the process is named. However the main interest is in fulfilling the critical success factor (CSF). For some metrics the target is to first determine a baseline of the organization's performance.

Table 2. Total Downtime and Uptime.

<b>CFS</b>	The service is available to its users according to the SLA.
<b>Definition</b>	The service downtime is measured since it may have SLA implications. The downtime is measured in a specified time period. Service uptime indicates time passed from the last downtime marking.
<b>Units</b>	Indicated both in minutes and percentage.
<b>Target</b>	Service uptime must be higher than 99,996% (SLA).
<b>Process</b>	Availability Management.

Table 3. Response Time.

<b>CFS</b>	The service is responsive to users' actions and does not restrict them from doing their duties.
<b>Definition</b>	Response time, number of response time delays including analysis of root cause, mean transaction response time.
<b>Units</b>	Indicated in seconds.
<b>Target</b>	The service must respond to users actions in less than 1 second (SLA).
<b>Process</b>	Availability Management.

Table 4. Number of Security Breaches.

<b>CFS</b>	Organization is protected against security violations.
<b>Definition</b>	Vulnerabilities are fixed and reviewed. Breaches may have implications on availability.
<b>Target</b>	All security breaches are reported.
<b>Process</b>	Information Security Management.



Table 5. Total SLA Violations.

<b>CFS</b>	The service provider is committed to the agreed service level.
<b>Definition</b>	Service levels are monitored and reported. All breaches to availability are reviewed.
<b>Units</b>	Violation count.
<b>Target</b>	Zero SLA violations.
<b>Process</b>	Service Level Management.

Table 6. Mean Time to Repair (MTTR).

<b>CFS</b>	The service provider is ready for service operation as it has the ability to react to problems.
<b>Definition</b>	The organization has the ability to repair sudden faults in the service caused by software bugs or broken hardware. These actions also include measures to add capacity. The time it takes to perform corrective actions is critical in the operational service.
<b>Units</b>	Indicated in hours.
<b>Target</b>	Determining a baseline.
<b>Process</b>	Problem Management.

Table 7. Mean RFC (Request for Change) Turnaround Time (MRTT).

<b>CFS</b>	The service provider is ready for service operation as it has the ability to release new features.
<b>Definition</b>	Change throughput measures the ability of the organization to maintain a live service. Requests for change can be initiated by the customer and the provider's internal change management.
<b>Units</b>	Indicated in days.
<b>Target</b>	Determining a baseline.
<b>Process</b>	Change Management.

Table 8. Number of Successful and Failed Changes.

<b>CFS</b>	The service provider is ready for service operations as it has the ability to release new features.
<b>Definition</b>	Deploying changes into the live service in a controlled manner.
<b>Units</b>	Number and percentage of changes categorized as successful or failed.
<b>Target</b>	Determining a baseline.
<b>Process</b>	Change Management.

Table 9. CI (Configuration Item) Data Quality.

<b>CFS</b>	The service provider is ready for service operations as it has the ability maintain an up-to-date configuration management system.
<b>Definition</b>	The critical components are mapped to services. The configuration is handed over to service transition as a part of the service design package.
<b>Units</b>	The number of correct and agreed configuration items, percentage of issues resulting from faulty configuration.
<b>Target</b>	Determining a baseline.
<b>Process</b>	Configuration Management.

## **7 EVALUATION**

The suggested service acceptance criteria (SAC) and metrics were evaluated to determine how well they serve the company's main decision makers and how they could be improved. The emphasis is on discovering which activities need attention while releasing a service. The evaluation does not go into details of the implementation but rather gives a high-level direction to the organization on what to focus on.

The aim of this thesis is to create suitable service acceptance criteria (SAC) for ERICA to be used in delivering releases of the service. The research problem is the top management's need of having more information on the service quality to base its decisions on during releasing.

### **7.1 Interviews**

The evaluation was conducted by interviewing three professionals in the ERICA project lead. To receive different perspectives on the matter several people in different roles were chosen to give feedback. Each interviewee had their individual interest in the acceptance criteria according to their position in the project:

- 1) Business Unit Director: contract management and financial implications.
- 2) Service Owner: quality management and service level management.
- 3) Head Designer: availability management and domain expertise.

Each professional was presented with the research question:

“How useful are the selected service acceptance criteria and metrics, and how would you improve them?”

#### **7.1.1 Head Designer**

Design science research method invites trial-and-error and applying a searching process in designing the artifacts. The Head Designer was the first person to be interviewed since he has experience and a talent for defining concepts and models. It was best that

the definitions and refinements were worked through with him and the artifacts were clarified before the interviews with the Service Owner and Business Unit Director.

The Head Designer has had a long career in software product research and development and systems architecture. To him, applying the user-centered design method in the project is a key factor. As a designer he seeks to ensure that the design and implementation of the service meet the customer requirements. He keeps an eye on high availability and reliability as well as usability.

His perspective on delivering the ERC system as a service is that it makes things easier for the provider. Control over releasing is in the hands of the deliverer since they are operating in a known and real environment instead of a test environment or an unknown customer environment. It also confines the customer from breaking the service with their ill-advised actions. Good design enables flexibility in design choices and comprehensive testing in his opinion. [Head Designer, 2013]

The service acceptance criteria checklist does not raise many comments with the Head Designer. He simply responds:

“I’m not interested in the next release. I look further ahead so that we produce the best service possible in the long haul.”

The metrics however caused more discussion. The first two metrics are relevant in his mind but only in conjunction with user experience. As long as the users are able to perform their normal day-to-day functions they are not bothered about down time or slower response times, he claims. The trouble is that user experience cannot be measured with ‘hard’ metrics such as these. The Head Designer encourages defining metrics that are ‘softer’, qualitative rather than quantitative. Such would give more insight into what the user really thinks of the performance of the service. It is more difficult to measure but certainly valuable in improving the service. The Head Designer states that the most important metric, customer satisfaction, is missing from the list altogether.

The number of security breaches on the other hand does not seem useful in his opinion. If the defined security breach does not cause the user any hindrance, it’s not worth measuring. Security is a priority quality of the service but as such these violations could be counted as a bug that is fixed, he concludes.

“The user experience is the basis for design, not avoiding SLA violations”, he exclaims on the Total SLA Violations metric. Measuring service levels is a necessity to fulfill the terms of the contracts, he agrees. The appropriate measuring points have been implemented to monitor for example availability. Nonetheless it is not a top priority to him. This reveals a distinct difference in the interests between the roles. The Head Designer does not navigate along the contracts but he is focused on creating customer value and the desired functionality of the service.

The mean times to repair and introduce a change are useful metrics that support the maintainability of the service. The Head Designer is not keen on measuring whether the developing team takes three or six hours as long as it doesn’t disrupt the customer. The goal should be preventing bugs in the first place, he emphasizes. In order to measure successful changes there needs to be a reasonable classification of a change, he adds.

The Head Designer picked out configuration item data quality as one the top three most useful metrics. However it is yet again a metric that requires a ‘softer’ approach since it’s most likely not very beneficial in trying to display data quality in charts, the Head Designer determines.

### **7.1.2 Service Owner**

The Service Owner has 20 years of experience in configuration and release management. He has been involved in the company’s internal quality management and is active in the national quality standardization work. The Service Owner is a member of the ERICA steering group. He is also responsible for information security.

The service acceptance criteria checklist tasks are listed in the order of importance stated by the service owner. The six items are produced in the natural workflow of delivery preparation. The SLA needs to be revised before other plans are executed, as it steers the targets for the entire release.

As the Service Owner evaluates the metrics, he states that the targets of the provider need to be higher than the requirements.

“We need to exceed the customer’s expectations and improve the service performance until the service level targets near 100%”, he exclaims.

To further improve the metrics he would develop exact mathematical formulas to gain appropriate measurement methods. On the other hand, the target of zero SLA violations raises an objection. The Service Owner elaborates by saying,

“for the process to be functioning properly it is expected to expose deviations, which are reported in the spirit of complete openness”.

The reputé of a high quality organization is not based on zero findings. When for example a security breach is reported regardless of its minor implications, it's a sign of the service provider's trustworthiness. Information security is highlighted in the interview with the Service Owner. [Service Owner, 2013]

All in all, documentation is vital in delivering a service, the Service Owner remarks referring to the company's configuration audits. Decision-making is based on up-to-date documentation. Yet, he states that paperwork and figures are only a starting-point to acceptance. The hard decisions are made by the leaders in both organizations, those delivering and those receiving the service.

When talking about service management practices the Service Owner tentatively criticizes the ITIL framework's complexity. He prefers the ISO/IEC 20000 standard's more condensed approach and precise language.

### **7.1.3 Business Unit Director**

The Business Unit Director is a part of the company's top management and a member of the ERICA steering groups. He is responsible for reporting on the progress of the project to the company executives as well as to the customer and other stakeholders such as the Ministry of the Interior.

To the director in charge of the ERICA project the service acceptance criteria provide a means of preparing the customer for deployment. The incremental development creates several opportunities to discuss the acceptance of a release, which paves the way for transitioning into live operation. The deployment of a service is a hard and a slow decision process for the receiving organization. They have to assess how the deployment affects their operational continuity. The provider can do their part in contributing to the decision process of the customer by assuring that the service quality is according to the agreed level.

The ERICA service level agreements have been agreed at the beginning of the project which is ideal in terms of the provider-customer collaboration, says the Business Unit Director. The agreements will be revised before the final delivery but not many changes are expected, the director estimates. The service acceptance criteria presented in Table 1 are mainly intended to guide the provider's internal release preparation. The release records provide proof of quality of the service and are of interest to the customer too. [Business Unit Director, 2013]

The Business Unit Director appreciates the RACI matrix incorporated with the SAC checklist. In his view it makes the responsibilities that he ultimately governs more visible and it also assures that the organization “focuses on the right things”, he adds. The Director points out fail-over mechanisms as an area of special attention since it will be imperative that the provider is prepared for ‘rainy day’ scenarios. He prizes preparedness to exceptional conditions higher than information security.

For the Business Unit Director the Mean Request for Change (RFC) Turnaround Time is an interesting indicator, as time to market determines the viability of future business. This metric sustains the continuance of the service. For him, the performance of the organization is of higher significance than the performance of the service.

## **7.2 Results**

The interviews conducted around the SAC checklist and the metrics were very informative in revealing the particular interests and aspirations of the project lead. It is apparent that each professional has a unique look on delivering a service based on their personal strengths and professional expertise.

Their stance on the Service Acceptance Criteria was favorable presumably due to the fact that all of the presented service acceptance criteria seem reasonable in delivering a service. They caused few differences of opinion. However the Director remarked that all quality considerations must be performed cost-effectively. The objective of the service acceptance criteria is to advance the transition into service operation on schedule, in addition to reducing the possibility of SLA sanctions while in operation. [Business Unit Director, 2013]



In regards to the metrics, the interviewees were asked to select three most useful metrics in the role they operate in. The results are shown below in Table 10, in which the metrics are scored with numbers from 1 to 3, number 1 being the most useful. The variance in viewpoints is evident as six out of the eight metrics were mentioned. Downtime and uptime information are valued by all, and it's marked as most useful by two participants. Response time was voted as the second most useful metric twice as well. At the same time the Business Unit Director states that Mean RFC Turnaround Time is the most important metric. In light of the SLAs it nevertheless must be concluded that response time is more significant to the customer, and hence should be placed second in the overall score. It must be mentioned that all the six metrics selected in the interviews have a high priority in the evaluation and thus should be given attention when developing a service dashboard.

Table 10. The three most useful metrics.

<b>Metric</b>	<b>Business Unit Director</b>	<b>Service Owner</b>	<b>Head Designer</b>	<b>Total Score</b>
Total Downtime and Uptime	3	1	1	<b>1</b>
Response Time		2	2	<b>2</b>
Number of Security Breaches		3		
Total SLA Violations	2			
Mean Time to Repair (MTTR)				
Mean RFC Turnaround Time (MRTT)	1			<b>3</b>
Number of Successful and Failed Changes				
CI Data Quality			3	

## 8 CONCLUSIONS

The purpose of this thesis work was to build and evaluate service acceptance criteria and suitable metrics for releasing a critical service. The build phase was designed incrementally and the initial set of artifacts is published in this paper. The evaluation was conducted by interviewing three key professionals in the management team. The in-person interviews were chosen as a method instead of focus groups to determine the different ‘voices’ in the organization. This objective was achieved as the wide range of opinions and emphasis on diverse metrics illustrates. The professionals are distinctly oriented towards their field of specialization and portray these views also on service management. This finding reinforces the notion that the key project roles are staffed successfully.

The results of the study indicate that the leadership regards measuring downtime and uptime along with response time as the most useful metrics. The researcher interpreted the overall score on the grounds of the SLA leaving Mean Request for Change Turnaround Time (MRTT) at the third place. In reality the Business Unit Director holds the lead in determining the priorities on what the organization’s focus is as he is responsible for profitability and business continuity. It remains to be seen whether these ambitions are conflicting and which metrics are implemented first.

To balance the discord concerning the metrics the leadership is fairly unanimous on the content of Service Acceptance Criteria as they consist of conventional release management functions. Perhaps more variation will emerge when the outputs are refined in more detail in the next build and evaluate cycle. Another finding in the work that deserves a mention is the use of RACI matrix alongside the SAC checklist. Clarification of responsibilities is beneficial as the organization works to accomplish the acceptance of releases.

For the organization the value of evaluating the service acceptance criteria and metrics has been in raising conversation among the senior management. The different objectives and concerns have been addressed and a structure for future activities has been established. The SAC checklist and metrics must be further refined and assessed before implementing a service dashboard or a balanced service scorecard. It is reasonable to assume that although conducting a case study in a real life context not all challenges of

the operational environment have yet been met, and security issues may arise into a more prominent role. Customer relations also have more weighting as the time draws near to deploy into live operation environment.

For the writer the thesis work has given an opportunity to become acquainted with the service management principles and to apply them in a critical service environment. It has also provided a lookout into the organization's wealth of knowledge and expertise. This study functions as a well-founded starting point for my continuing work amidst service management and down the line it hopefully culminates in the successful deployment of the ERICA service into operational use. My sincere wish is that other service management professionals find the groundwork and obtained results useful in similar encounters.

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